

ONTARIO MINISTRY OF ENVIRONMENT



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1969

**OPERATING  
SUMMARY**

# **BURLINGTON**

**Elizabeth Gardens**

**water pollution  
control plant**

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Division of Plant Operations

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Burlington Elizabeth Gardens :  
water pollution control plant.

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*Water management in Ontario*

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Water Resources  
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The operating efficiency and financial status of the water pollution control facilities operated for you in 1969 are presented in the following pages.

The regional operations engineer's comments and the statistical data will assist you in gauging the plant's level of performance. A new flow chart and up-to-date design data are also provided.

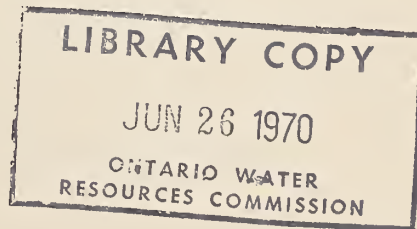
Various divisions and sections within the Commission have co-operated in providing what we trust is an accurate and concise annual operating summary.

  
D.S. Caverly,  
General Manager.

  
D.A. McTavish, P. Eng.,  
Director,  
Division of Plant Operations.



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**Elizabeth Gardens**  
**water pollution control plant**

operated for

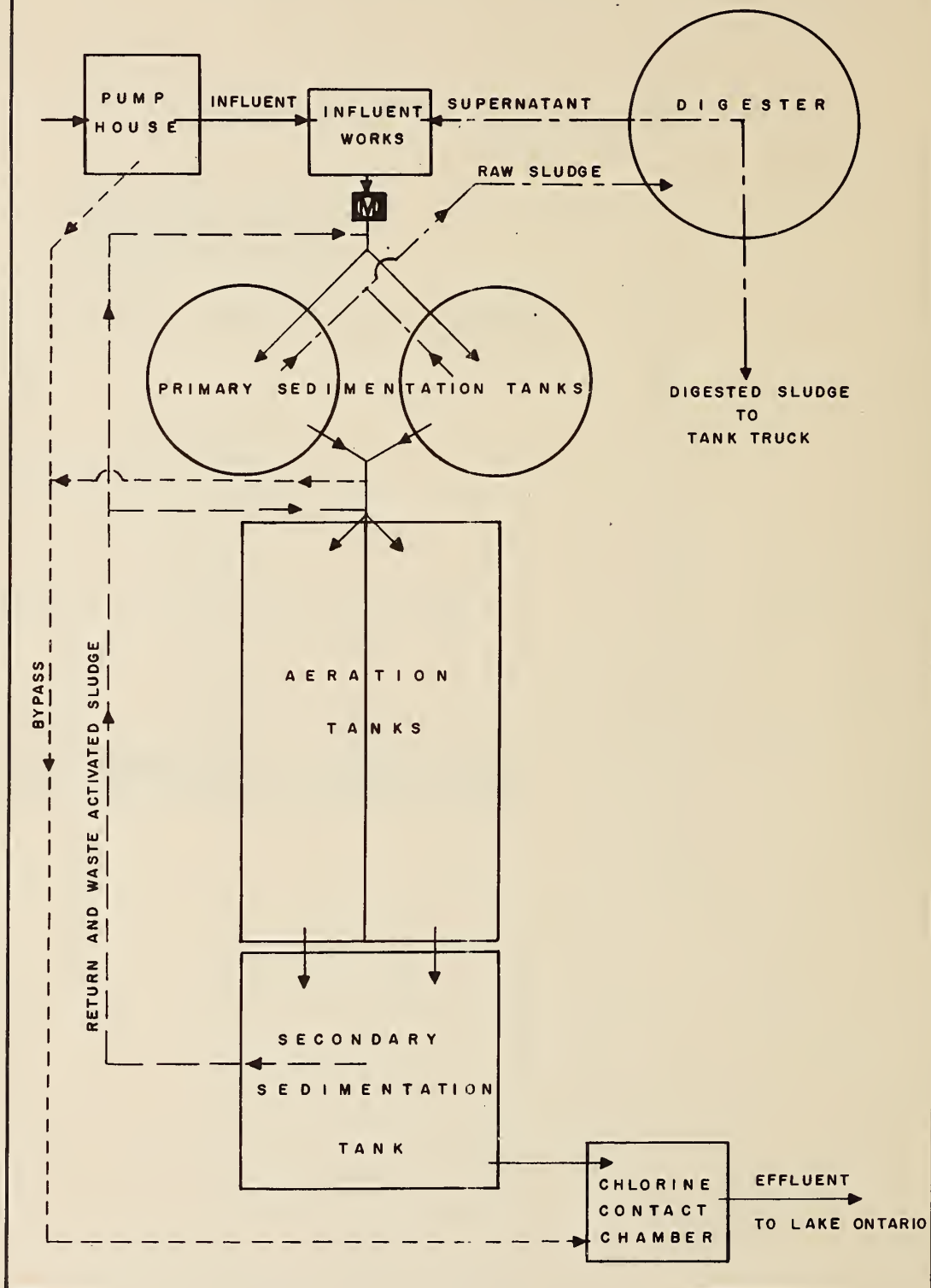
**THE TOWN OF BURLINGTON**

by the

**ONTARIO WATER RESOURCES COMMISSION**

**1969 ANNUAL OPERATING SUMMARY**

# BURLINGTON ELIZABETH GARDENS WATER POLLUTION CONTROL PLANT





# DESIGN DATA

PROJECT NO.	2-0028-58	TREATMENT	Activated Sludge
DESIGN FLOW	0.750 mgd	DESIGN POPULATION	7,500
BOD - Raw Sewage	253 mg/l	SS - Raw Sewage	280 mg/l
- Removal	90-95%	- Removal	95%

## LIFE STATION

### Pumps (@ 35' tdh)

One Fairbanks-Morse 600 gpm (electric)  
 One Smart-Turner 250 gpm (electric)  
 One Smart-Turner 125 gpm (electric)  
 One Smart-Turner 300 gpm (gas)

## PRIMARY TREATMENT

### Comminution

Type: Barminutor  
 Size: Model B (18")

### Grit Removal

Type: Air degritter (with 4 Colaflex diffusers)  
 Size: 14' x 8' x 7' (avg depth)  
 Retention: 10 min

### Primary Sedimentation

Type: Dorr  
 Size: Two 22' dia x 9' swd (6250 gal)  
 Retention: 2 hours  
 Loading: Surface, 980 gal/ft<sup>2</sup>/day  
 Weir, 5,430 gal/ft/day

## SECONDARY TREATMENT

### Aeration Tanks

Type: Diffused air, Single-pass  
 Size: Two 98' x 19½' x 12'  
 (44,000 cu ft or 274,000 gal)  
 Retention: 8.8 hours

## Air Supply

Two Hoffman Cyclo Blowers  
 Size: 750 cfm each

### Diffusers

60 Colaflex diffusers per tank

## Secondary Sedimentation

Type: Dorr  
 Size: Two 40' x 40' x 10' swd (8,600 gal)  
 Retention: 2.75 hours  
 Loading: Surface, 470 gal/ft<sup>2</sup>/day  
 Weir, 4,690 gal/ft/day

## CHLORINATION

W & T 200 lb/day

### Chlorine Contact Chamber

Retention: 10 min

## OUTFALL

- to Lake Ontario

## SLUDGE HANDLING

### Digestion System

Type: Single-stage with one Dorr-Oliver draft tube mixer  
 Size: One 45' dia x 20' swd (31,600 cu ft or 196,000 gal)  
 Loading: 1.6 lb/ft<sup>3</sup>/mo

# '69 REVIEW

## GENERAL

The Burlington Elizabeth Gardens Water Pollution Control Plant treated a total flow of 390.3 million gallons during 1969, representing an increase of 0.5 percent over last year's flows. The average daily flow of 1.1 million gallons exceeded the design flow of 0.75 mgd 80% of the time during the year.

A design report on methods of alleviating the hydraulic overloading to this plant will be completed sometime in March, 1970, by the Town's consulting engineers.

A digester cleanout was initiated in November in preparation for repairs to the digester roof. The repairs will involve the removal of the roof from the digester; the replacement of the roof skirt; spot repairs to the roof, and re-installing the roof on the digester. It is anticipated that this work will be completed in May or June.

## EXPENDITURES

The 1969 operating costs were \$28,721.33. This was a 29 percent increase over 1968, attributed mainly to higher costs for sludge haulage during repairs to the digester roof.

### PLANT EFFICIENCY

The average raw sewage BOD and suspended solids concentrations were 130 and 150 milligrams per litre respectively. The average effluent BOD and suspended solids concentrations were 11 mg/l and 13 mg/l respectively. The average effluent results do not necessarily reflect the true effluent quality during periods of high storm flows, since composite eight-hour sampling is carried out only twice a month. Storm flows can wash considerable amounts of solids over the final clarifier weirs.

A total of 518 cu. ft. of grit was removed from the plant during the year.

### AERATION

The average loading in pounds of BOD per pound of MLSS was 0.23. The average cubic feet of air required per pound of BOD removed was 1,929, while the average MLSS concentration was 2,123 mg/l.

### SLUDGE DIGESTION and DISPOSAL

The average volatile solids reduction was 36%, which is less than the design volatile solids reduction. Efforts will be made in 1970 to improve the efficiency of the digester operation.

## **CONCLUSIONS**

The plant is hydraulically overloaded 80% of the time, resulting in considerable loss of solids over the final clarifier weirs during high storm flows. The Town will receive a report from its consulting engineers in March, 1970, on alleviating this overloading.



## 1969 OPERATING COSTS

PAYROLL	35 %
FUEL	1 %
POWER	19 %
CHEMICALS	4 %
GENERAL SUPPLIES	3 %
EQUIPMENT	1 %
REPAIRS & MAINTENANCE	6 %
SUNDRY	29 %
WATER	2 %
TRAVEL	0 %

## TOTAL ANNUAL COST

NET OPERATING	44 %
DEBT RETIREMENT	21 %
INTEREST	33 %
RESERVE FUND	2 %

## Yearly Operating Costs

YEAR	MILLION GALLONS TREATED	TOTAL OPERATING COSTS	COST PER MILLION GAL	COST PER LB OF BOD REMOVED
1965	299.87	\$21,966.58	\$73.25	6 cents
1966	297.76	23,894.31	80.25	7 cents
1967	383.66	24,427.22	63.67	7 cents
1968	388.37	22,110.92	56.93	5 cents
1969	390.30	28,721.33	73.58	6 cents



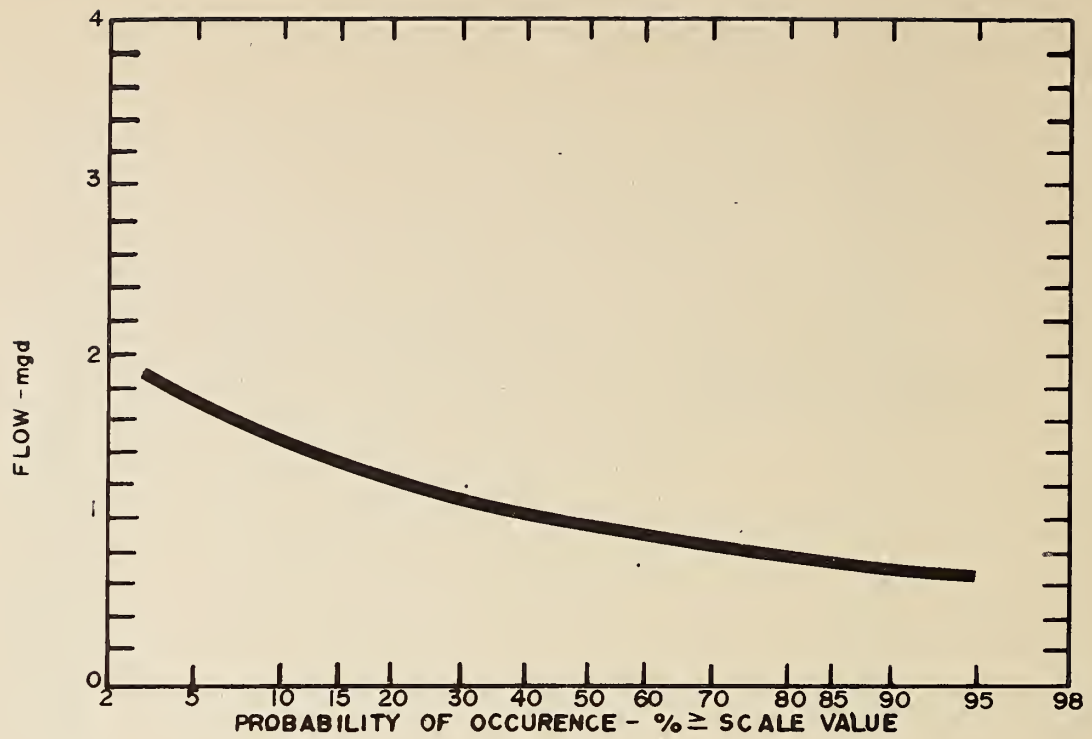
# Monthly Operating Costs

MONTH	TOTAL EXPENDITURE	PAYROLL	CASUAL PAYROLL	FUEL	POWER	CHEMICALS	GENERAL SUPPLIES	EQUIPMENT	REPAIRS and MAINTENANCE	SUNDRY *	WATER
JAN	1945.28	1129.99	138.00	-	547.94	-	32.31	-	48.00	-	49.04
FEB	2096.85	751.90	51.91	131.31	439.84	44.56	73.25	-	205.09	349.96	49.04
MAR	1849.83	717.17	-	100.69	407.52	-	21.96	-	-	553.45	49.04
APR	1818.17	770.95	-	-	410.56	-	61.54	-	48.54	477.54	49.04
MAY	1059.72	798.93	-	-	525.17	-	14.40	-	104.08	568.10	49.04
JUNE	2518.89	808.97	-	-	412.48	220.50	390.92	-	145.42	491.56	49.04
JULY	1931.53	780.63	-	-	434.08	220.50	99.82	-	53.46	294.00	49.04
AUG	2167.63	1161.96	-	-	481.22	-	20.75	31.21	51.93	371.52	49.04
SEPT	2717.88	754.08	-	168.07	496.08	587.11	133.23	-	43.45	535.86	-
OCT	2825.67	745.62	-	-	440.16	198.45	25.88	141.75	652.47	572.30	49.04
NOV	1385.09	765.63	-	-	433.76	-	28.32	-	43.56	64.78	49.04
DEC	5404.79	572.41	-	-	401.45	-	87.41	-	204.39	4041.05	98.08
TOTAL	28721.33	9758.24	189.91	400.07	5430.26	1271.12	989.79	172.96	1600.39	8320.11	588.48

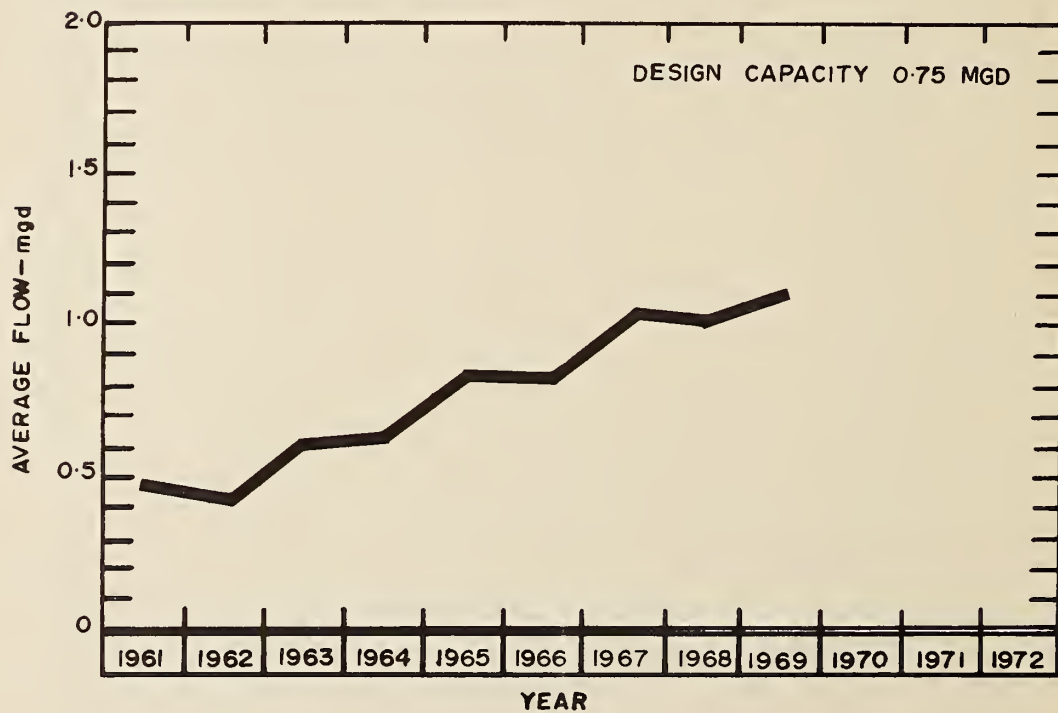
\* SUNDRY INCLUDES SLUDGE HAULAGE COSTS WHICH WERE \$7,662.70



**PROCESS DATA**



## FL O W S

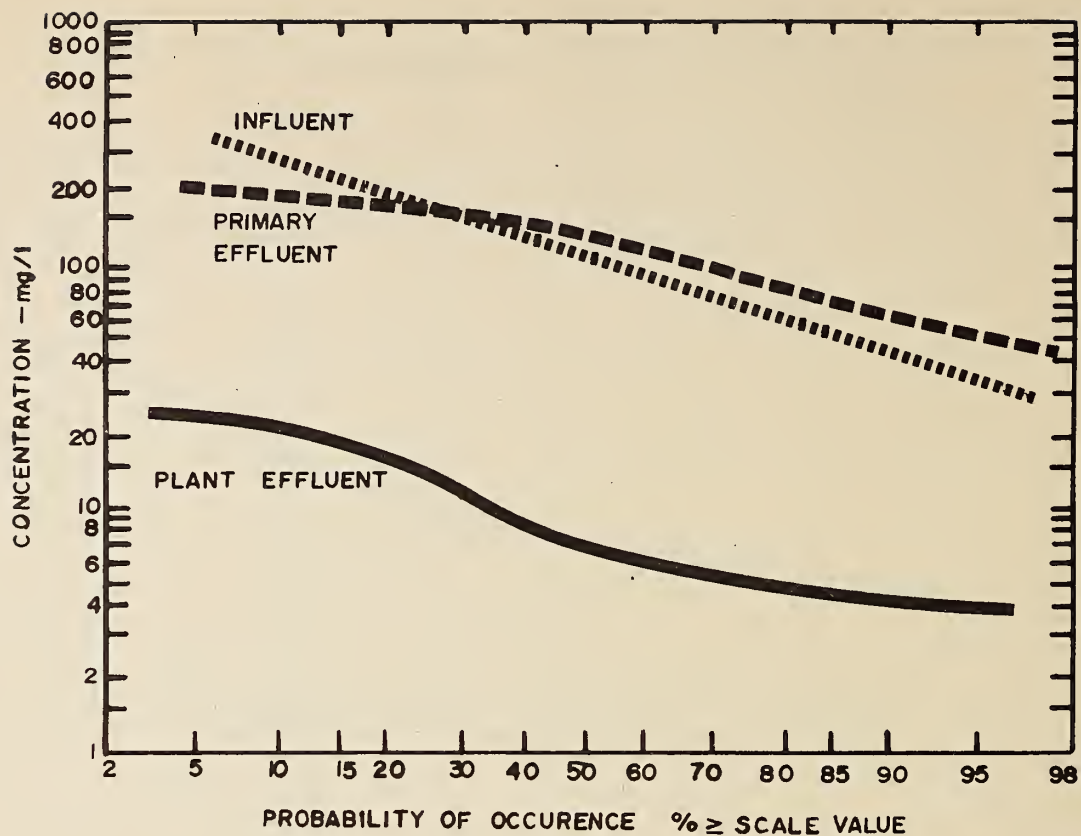




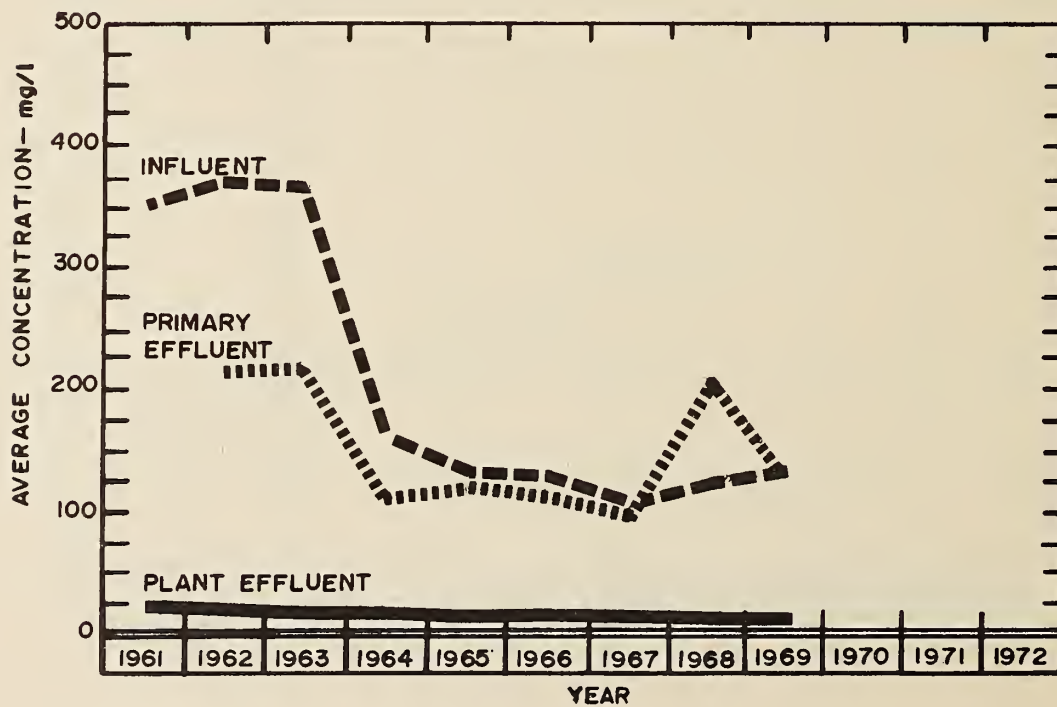
## PLANT FLOWS and CHLORINATION

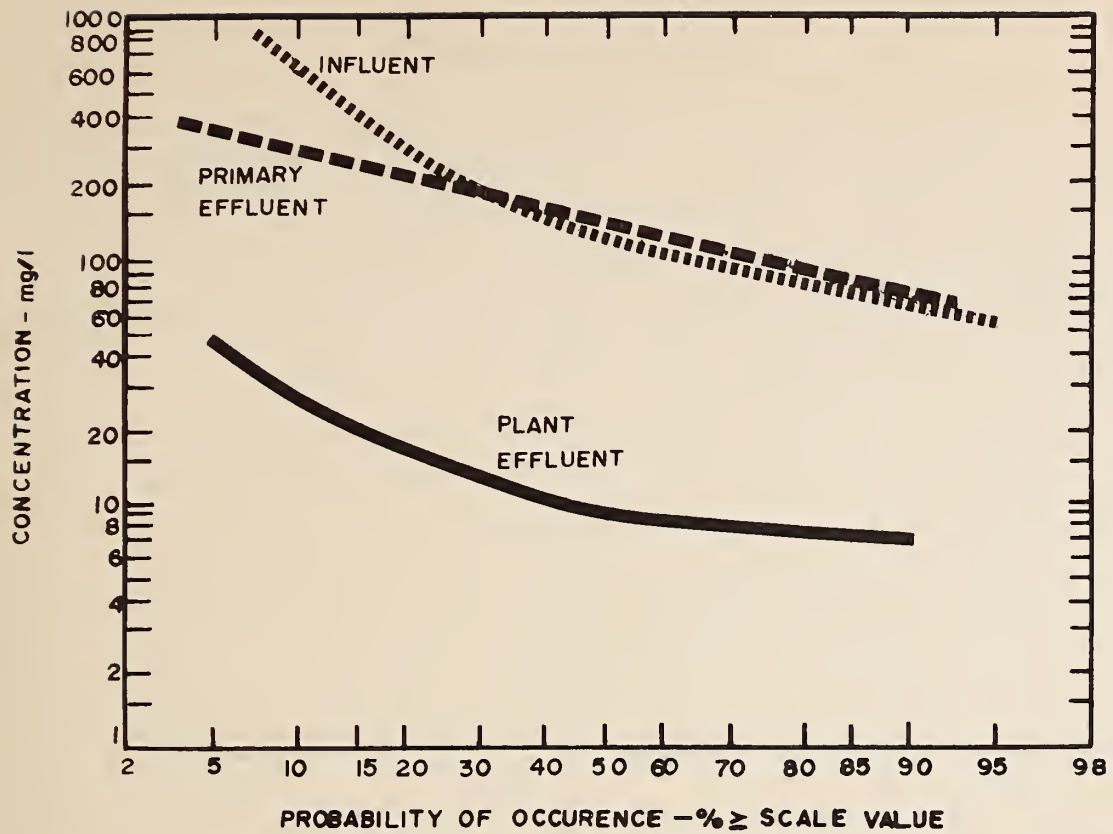
MONTH	TOTAL FLOW mil gal	AVERAGE DAILY FLOW mil gal	MAXIMUM DAILY FLOW mil gal	MINIMUM DAILY FLOW mil gal	CHLORINE USED pounds	DOSAGE mg/l
JAN	36.3	1.14	2.4	.7	0	0
FEB	27.1	.97	1.4	.8	0	0
MAR	27.9	.91	1.4	.5	0	0
APR	45.9	1.53	2.5	1.2	0	0
MAY	40.7	1.31	1.9	1.1	360*	.9
JUNE	30.0	1.00	1.4	.7	996	3.3
JULY	29.3	.95	1.8	.4	945	3.2
AUG	24.9	.80	.9	.7	949	3.8
SEPT	25.8	.86	1.1	.7	892	3.4
OCT	31.2	1.00	1.9	.7	415*	3.4
NOV	35.7	1.19	2.0	.1	0	0
DEC	35.5	1.14	2.4	.8	0	0
TOTAL	390.3	-	-	-	4536	-
AVERAGE	-	1.1	-	-	756	3.4

\*Chlorination from May 22 to October 14.

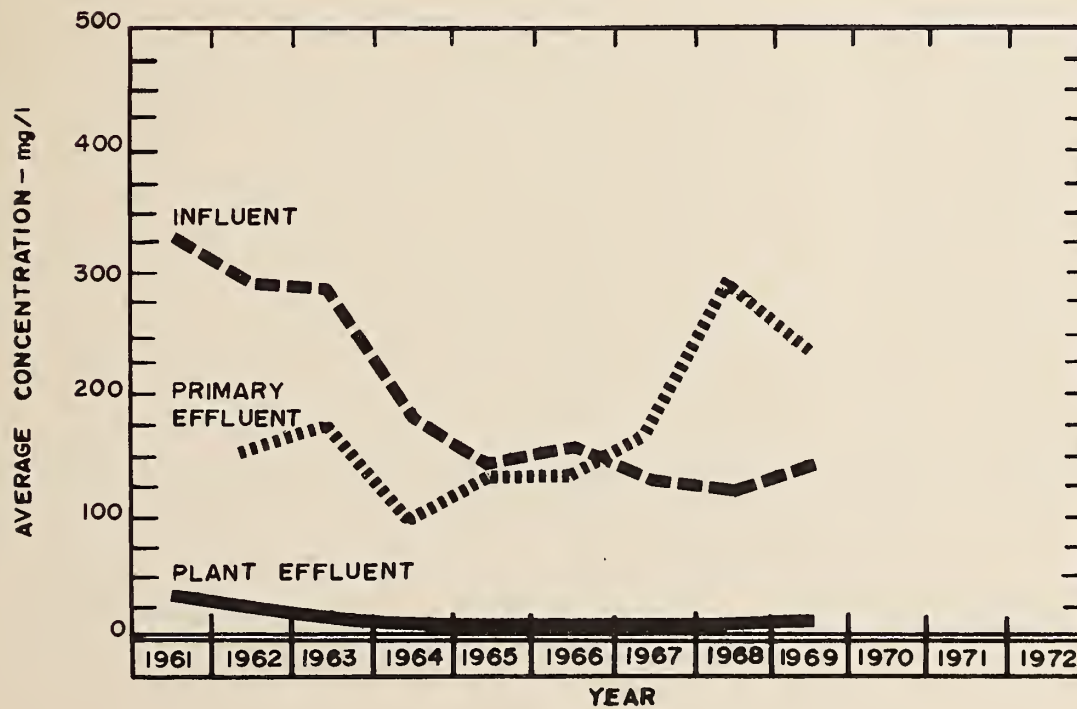


## BIOCHEMICAL OXYGEN DEMAND





## SUSPENDED SOLIDS



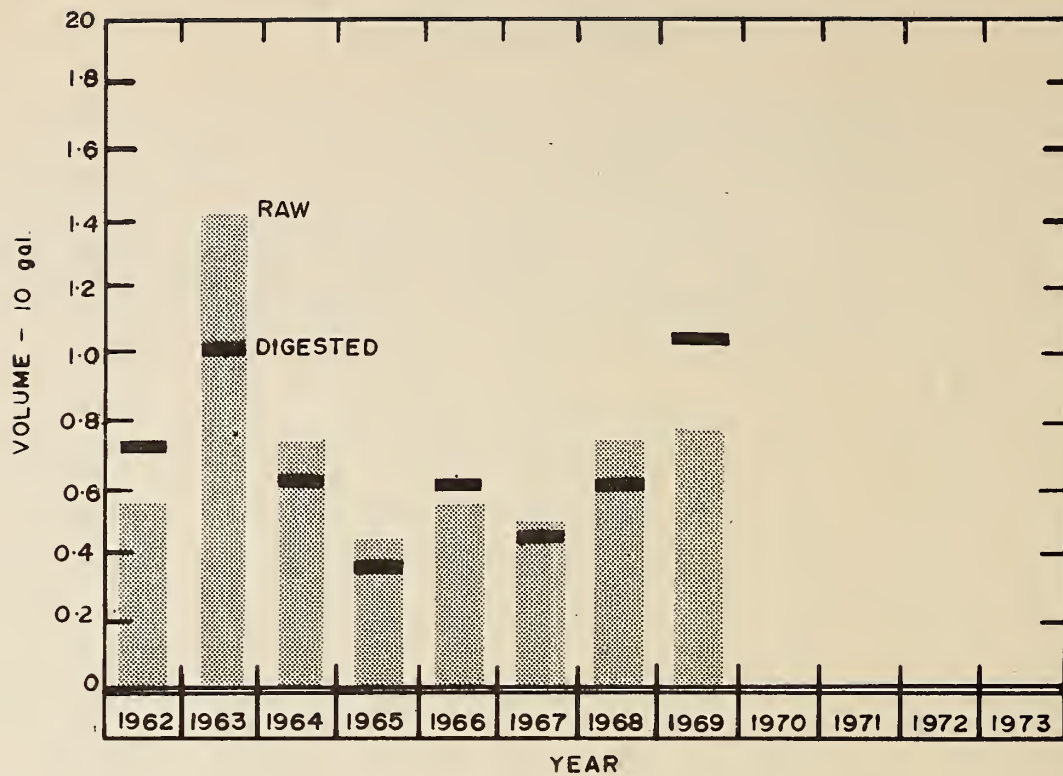
## PLANT EFFICIENCY

MONTH	BIOCHEMICAL OXYGEN DEMAND				SUSPENDED SOLIDS				GRIT REMOVAL
	INF. mg/l	EFF. mg/l	REDUCTION		INF. CONCN mg/l	EFF. CONCN mg/l	REDUCTION		
			%	10 <sup>3</sup> pounds			%	10 <sup>3</sup> pounds	cu
JAN	135	7	94	46.4	125	5	96	43.5	56
FEB	145	11	92	36.4	220	10	95	57.0	34
MAR	122	8	93	31.8	155	15	90	39.1	21
APR	78	6	92	33.0	60	8	87	23.9	17
MAY	140	9	94	53.3	110	13	88	39.4	36
JUNE	80	7	91	21.9	100	10	90	27.0	31
JULY	100	6	94	27.6	90	5	94	24.9	110
AUG	149	5	97	35.9	150	10	93	34.9	77
SEPT	180	16	91	42.3	235	10	95	58.1	25
OCT	145	13	91	41.2	145	10	93	42.1	96
NOV	140	17	88	44.0	180	18	90	57.9	72
DEC	143	34	76	38.7	238	52	78	66.1	43
TOTAL	-	-	-	-	-	-	-	513.9	518
AVERAGE	130	11	92	37.7	150	13	91	42.8	43

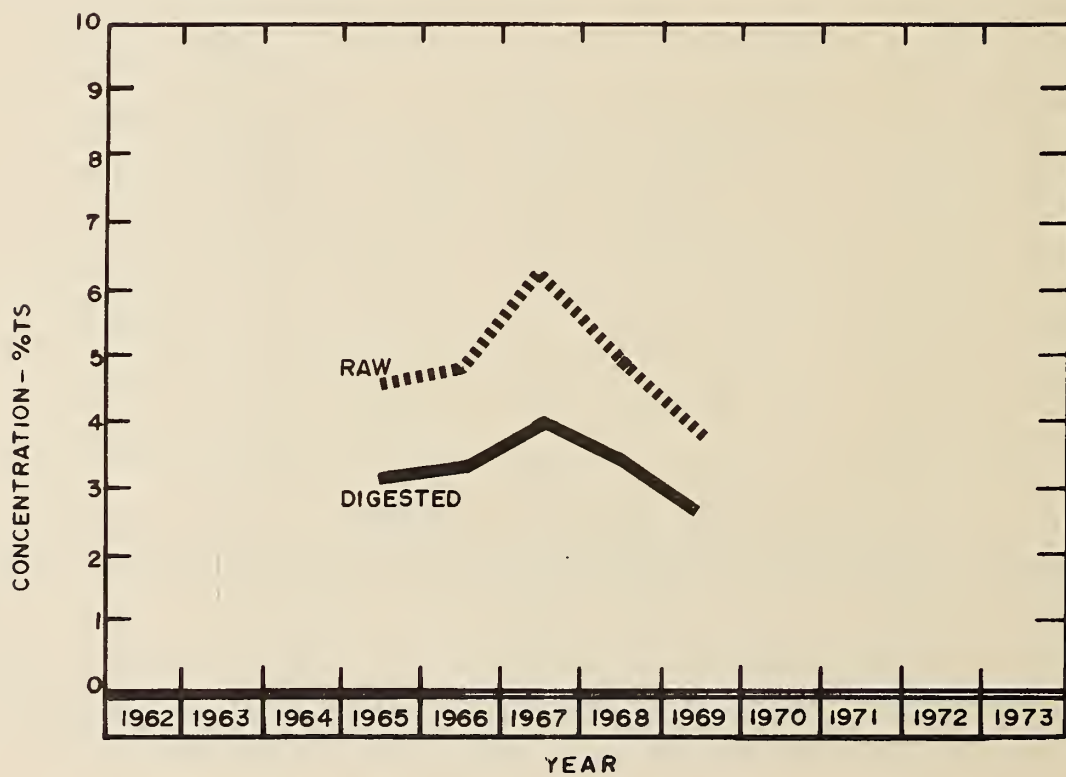
## AERATION

MONTH	AVG DAILY FLOW mil gal	AERATION INF.		SECONDY. EFF.		MLSS CONCN mg /l	F/M  lb BOD lb MLSS	AIR USED  1000 cu ft lb BOD	WASTE SLUDGE 10 <sup>6</sup> lb
		BOD	SS	BOD	SS				
		mg/l	mg/l	mg/l	mg/l				
JAN	1.14	170	205	7	5	1910	.36	.97	.159
FEB	.97	115	165	11	10	1840	.22	1.46	.034
MAR	.91	165	320	8	15	2240	.24	1.51	.016
APR	1.53	70	180	6	8	1700	.23	2.21	.018
MAY	1.31	145	110	9	13	1660	.42	1.66	.003
JUNE	1.00	103	125	7	10	2060	.18	2.06	.008
JULY	.95	85	87	6	5	1740	.16	2.88	.010
AUG	.80	94	190	5	10	1920	.14	3.03	.016
SEPT	.86	225	220	16	10	2390	.29	1.20	.018
OCT	1.00	105	575	13	10	2100	.18	2.35	.053
NOV	1.19	85	337	17	18	2590	.14	2.67	.125
DEC	1.14	206	340	25	18	3320	.25	1.05	-
TOTAL	-	-	-	-	-	-	-	-	.460
AVERAGE	1.1	130	237	10	11	2123	.23	1.92	.042





## DIGESTION



## SLUDGE DIGESTION and DISPOSAL

MONTH	RAW SLUDGE			DIGESTED SLUDGE			SUPERNATANT		SLUDGE DISPOSAL	
	VOLUME 10 <sup>3</sup> gal	TOTAL SOLIDS %	VOL SOLIDS %	VOLUME 10 <sup>3</sup> gal	TOTAL SOLIDS %	VOL SOLIDS %	VOLUME 10 gal	TOTAL SOLIDS %	DEWATERED cu yd	LIQUID cu yd
JAN	82.3	3.1	66	68.9	5.0	54	0	.2	0	414
FEB	71.9	4.3	86	73.3	2.6	66	0	.3	0	449
MAR	90.2	4.2	82	67.9	2.5	69	0	.3	0	417
APR	79.6	3.5	74	74.9	2.3	67	0	.3	0	452
MAY	53.9	2.6	78	67.0	2.4	69	-	-	0	414
JUNE	35.8	2.4	77	42.5	2.1	67	-	-	0	253
JULY	50.8	4.5	77	50.0	2.1	67	-	-	0	300
AUG	66.1	4.7	79	76.5	2.3	64	-	-	0	473
SEPT	82.4	3.3	72	85.3	2.3	74	-	-	0	507
OCT	88.2	3.7	69	126.7	3.7	66	-	-	0	453
NOV	35.6	3.9	75	55.0	-	-	-	-	0	327
DEC	44.0	7.0	76	234.7	-	-	-	-	0	1393
TOTAL	780.8	-	-	1022.7	-	-	-	-	0	6152
AVERAGE	65.0	3.9	75	85.2	2.7	66	-	.3	0	512





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